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AMENDMENTS TO THE CLAIMS

Listing of claims:

1-23 (Canceled)

24 (New): An apparatus, comprising:

a substrate;

a waveguide embedded within said substrate, wherein an optical signal may propagate through said waveguide;

at least two or more light sources disposed on a first side of said substrate along a length of said waveguide to emit light into said waveguide in at least partially transverse to a direction of propagation of the optical signal, the light emitted from said at least two or more light sources to pump the optical signal;

a reflector disposed on a second side of said substrate to reflect at least a portion of light emitted from said at least two or more light sources into said waveguide, the reflected light to pump the optical signal.

25 (New): An apparatus as claimed in claim 24, wherein said waveguide is doped with erbium.

26 (New): An apparatus as claimed in claim 24, wherein the light source is a vertical cavity emitting laser.

27 (New): An apparatus as claimed in claim 24, wherein light emitted from said light source has a wavelength in the range of 980 nanometers to 1480 nanometers.

28 (New): An apparatus, comprising:

a semiconductor substrate;

a waveguide embedded within said semiconductor substrate through which an optical signal may propagate; and

at least two or more semiconductor light sources disposed on a first side of said substrate along a length of said waveguide to emit light into said waveguide in a direction at least partially transverse to a direction of propagation of the optical signal, the light emitted from said at least two or more semiconductor light sources to pump the optical signal.

29 (New): An apparatus as claimed in claim 28, wherein said waveguide is doped with erbium.

30 (New): An apparatus as claimed in claim 29, wherein the light source is a vertical cavity emitting laser.

31 (New): An apparatus as claimed in claim 28, wherein light emitted from said light source has a wavelength in the range of 980 nanometers to 1480 nanometers.

32 (New): An apparatus as claimed in claim 38, further comprising a reflector disposed on a second side of said semiconductor substrate to reflect at least a portion of the light emitted from said at least two or more semiconductor light sources into said waveguide, wherein said reflector has a refractive index that is different than a refractive index of said semiconductor substrate.

33 (New): An apparatus, comprising

a semiconductor substrate;

a waveguide embedded within said semiconductor substrate through which an optical signal may propagate; and

at least two or more semiconductor light sources disposed on a first side of said substrate along a length of the waveguide to emit light into said waveguide, the light emitted from said at least two or more semiconductor light sources to pump the optical signal, wherein at least two of said at least two or more semiconductor light sources are disposed within a single light source substrate.

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34 (New): An apparatus as claimed in claim 33, wherein said waveguide is doped with erbium.

35 (New): An apparatus as claimed in claim 33, wherein at least a portion of the light emitted from said light source is transverse to a direction of propagation of the optical signal through the waveguide.

36 (New): An apparatus as claimed in claim 33, wherein the light source is a vertical cavity emitting laser.

37 (New): An apparatus as claimed in claim 33, wherein light emitted from said light source has a wavelength in the range of 980 nanometers to 1480 nanometers.

38 (New): An apparatus as claimed in claim 33, further comprising a reflector disposed on a second side of said semiconductor substrate to reflect at least a portion of the light emitted from said at least two or more semiconductor light sources into the waveguide, wherein said reflector has a refractive index that is different than a refractive index of said semiconductor substrate.

39 (New): An apparatus, comprising:

a semiconductor substrate;

a waveguide embedded within said semiconductor substrate through which an optical signal may propagate, said waveguide being doped with erbium; and

at least two or more lasers disposed on a first side of said substrate along a length of the waveguide to emit light into the waveguide in a direction transverse to a direction of propagation of the optical signal through said waveguide, the light emitted from said at least two or more lasers to pump the optical signal, wherein at least two of said at least two or more lasers are disposed within a single laser substrate.

40 (New): An apparatus as claimed in claim 39, wherein at least one of said two or more lasers is a vertical cavity emitting laser.

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41 (New): An apparatus as claimed in claim 39, wherein light emitted from said two or more lasers has a wavelength in the range of 980 nanometers to 1480 nanometers.

42 (New): An apparatus as claimed in claim 39, further comprising a reflector disposed on a second side of said semiconductor substrate to reflect at least a portion of the light emitted from said at least two or more lasers into the waveguide, wherein said reflector has a refractive index that is different than a refractive index of said semiconductor substrate.